

The Evolution of the Condensing Boiler has Arrived

By Kevin Flynn, Viessmann Regional Sales Manager – New England

Finally, the perfect residential condensing boiler is here. While you might assume that this is new technology, the Viessmann Vitocrossal 300, CU3A Boiler has been in production, in Europe, since 1996. The CU3A demonstrates true Viessmann philosophy; with ease of installation and serviceability, low energy consumption, high mass design, and the highest grade of materials available, this boiler certainly checks all the boxes. It's exactly what you would expect from Viessmann!

EASE OF INSTALLATION

First, the CU3A is a floor mounted boiler. In most homes, the boiler room is rarely on an outside wall. This leads to having to build a wall or purchase a boiler stand for most other boilers. Not anymore, taking up at most, 5.5 square feet of floor space, this boiler is free standing and can go anywhere. Throw away those heavy cement blocks. The vessel and burner on the CU3A are kept well above the floor.

The ease of installation doesn't stop there though. Because of the CU3A's high water volume design and extremely low pressure drop, it does not require any special piping configuration such as, boiler pumping, primary/secondary piping or low-loss headers, like most of its competitors. If you're replacing an old cast-iron sectional boiler, the CU3A is the perfect "drop-in" replacement. Simply, connect the boiler's supply to the system's supply and the boiler's return to the system's return. All of the system piping can remain the same. If this is a new installation, think of the money and labor you'll save not having to purchase, pipe and power a boiler pump or add special near boiler piping arrangements. Flue venting has been simplified as well. The exhaust connection and intake air connection are located at the bottom of the boiler, only 11.5" off the ground. Trying to sleeve an existing chimney with a low thimble? No problem for the CU3A.

FAST & EASY COMMISSIONING

The Vitotronic Boiler and System Control arrives preset with the basic factory-set parameters to handle most applications. Site specific adjustments, such as time, date and language, can be set up during the initial set-up wizard when the unit is first turned on. If you've forgotten to connect an outdoor sensor or domestic hot water sensor, the control will let you know, in plain text.



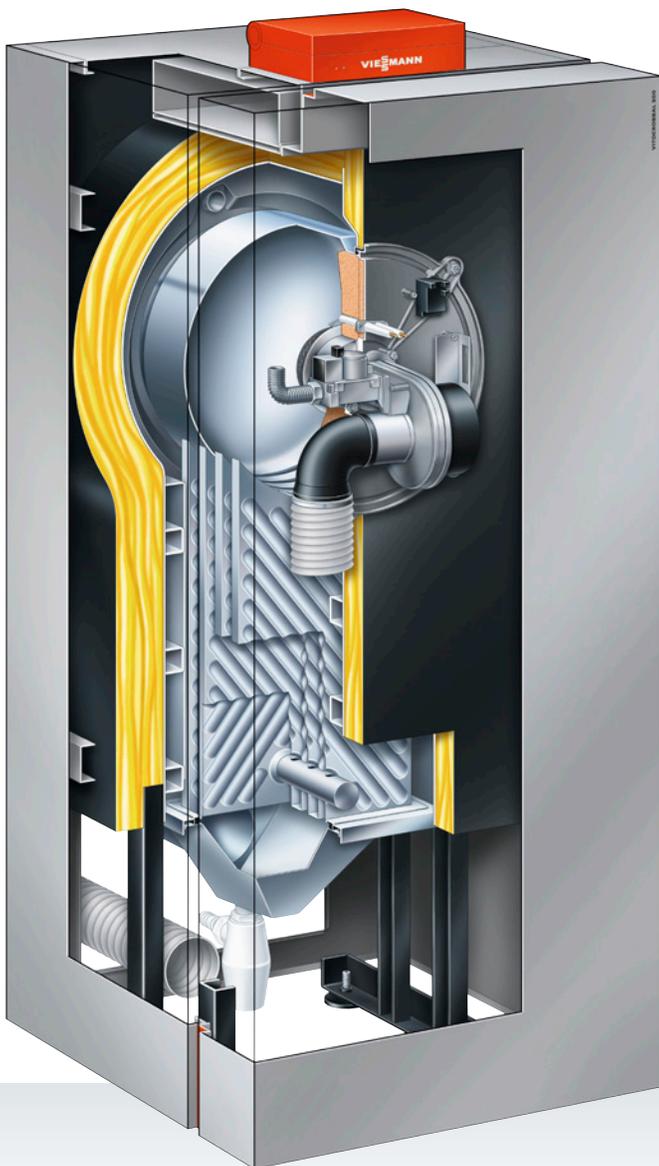
Vitocrossal 300, CU3A

Of course, we don't ever want you to throw away your combustion analyzer however, because of a feature called Lambda-Pro, you'll never need to calibrate the combustion on the CU3A. It does that for you. In fact, Viessmann is the only manufacturer to offer this Lambda-Pro technology. This technology not only self-calibrates the combustion at start-up, it also carries out periodic checks to insure that the CU3A is always running at the best possible combustion efficiency. If at any time, the combustion is found to be out of range, the unit will initiate a safety shut down. Lambda-Pro on the CU3A also allows for fuel switching without an orifice change. When switching from Natural Gas to Propane or even LNG (or back again) simply, turn a quarter turn screw on the gas valve. Now, that's Fast & Easy!

SERVICEABILITY IS A BREEZE

While we don't like to think about it, all gas boilers require service and preventative maintenance occasionally to insure that they continue to operate at peak performance. We know that your time is limited and valuable. It's obvious that Viessmann has designed the CU3A with this in mind. Because of the CU3A's smooth wall, vertical fire-tube design, the flue gasses and condensate always travel in the same direction, creating a self-cleaning effect within the boiler's heat exchanger. You'd like to inspect the inside of the boiler anyway? No problem; simply pop off the front cover, break the gas union, remove 4 bolts and the entire burner and gas valve comes right off. You can then hang the burner right on the support hook provided. You'll now have complete access to the burner components, such as the electrodes and burner mesh, as well. To remove any visible dust or debris that may have collected on the heat exchanger, simply spray it down with a garden hose. What will you do with all your extra time when you start installing the CU3A?

Were you aware that the burner's refractory material on many boilers is made of a ceramic fiber material that, when heated, becomes a harmful carcinogen. When servicing those boilers, the manufacturer instructs the service contractor to use a respirator and prevent air born dust. No need to worry with the CU3A from Viessmann. Our refractory is a potato based starch material that is actually safe to eat.



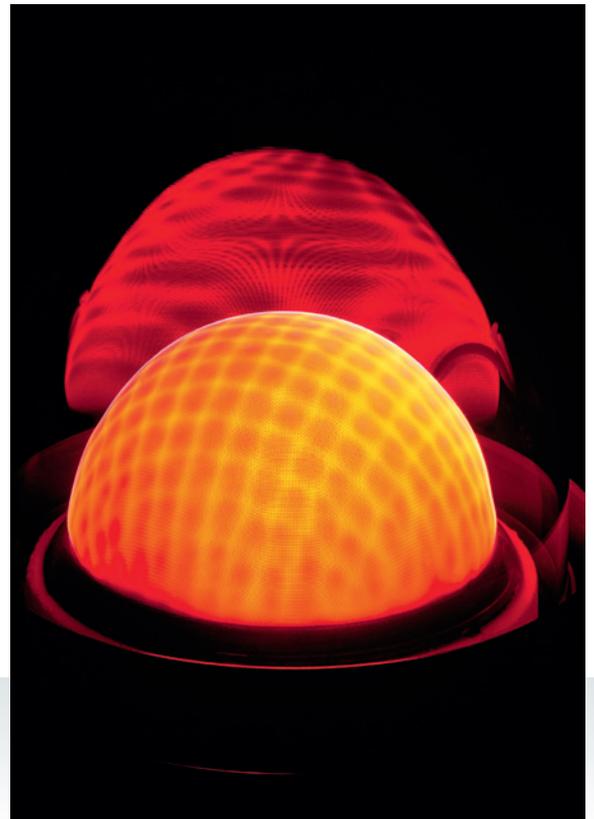
HIGH MASS / HIGH WATER VOLUME

This has always been at the heart and soul of the Viessmann philosophy. Why have high water volume in your hydronic heating system? To answer this, we have to look at how heating systems are designed. In most cases, we size our heating system and boiler so that it's able to heat our home on the coldest day of the year, and then some. Would it surprise you to know, in most cases, this "coldest day of the year" only occurs for a few hours every heating season? This means that the rest of the year, your boiler is TOO Big. This oversizing could lead to "short cycling" meaning that the boiler may only run for a minute or two. This creates two problems. First, the boiler doesn't run long enough to achieve peak combustion efficiency and second, this cycling leads to faster component wear and tear.

Most manufacturers handle this by having high turndown ratios. Turndown ratio describes the burner's / boiler's ability to modulate. For instance, a 5:1 (5 to 1) turndown ratio means that the unit will modulate down to 20% of its full input so, a 100,000 BTU boiler with a 5:1 turndown will operate as low as 20,000 BTU per hour. Very often, this still isn't low enough to account for that small zone on a 50 degree day so, some manufacturers will utilize a higher turndown ratio. A 10:1 perhaps. Now that 100,000 BTU boiler will run as low as 10,000 BTU/hour. This should solve the problem, right? Well, it will certainly solve the short cycling issue however, another issue is created by doing this.

Look at most installation manuals for most boiler manufacturers (including ours) and you'll notice something interesting. The levels of O₂ (oxygen) are higher when the boiler is running at lower inputs. The reason for this would require another entire white paper explanation but, suffice it to say, higher levels of oxygen actually decrease boiler efficiency by reducing the boiler's ability to condense.

So how do we solve this problem? The CU3A couples a moderate turndown ratio (5:1 in our case) with high water volume. This means, even under low load conditions, the burner still has to run for a longer amount of time to heat up the water volume. Have no fear. This extra energy is not wasted. Due to nearly 4" of insulation around the CU3A, this energy always remains in the heating system. In many cases, it's common for a zone to cycle on and off a few times without the burner even firing. The CU3A contains up to nearly 19 gallons of water. Most other condensing boilers available in this size range hold a half gallon to 2 gallons of water. In fact, in some cases, installers are asked to add something called a buffer tank to other systems. This is just a tank that holds extra water but, why have to purchase and pipe an additional tank when this is an integral part of the CU3A's design. This insures that the CU3A has long run cycles as well as long off cycles. The best of both worlds.



STAINLESS IS STAINLESS, RIGHT?

Why is material construction so important when choosing a condensing boiler? Most condensing boilers tout that they are constructed using stainless steel but, are all grades of stainless steel the same? Viessmann has always, and only, chosen to use SA 240-316Ti in the construction of all of our condensing boilers (and our indirect water heaters) and the CU3A is no different. 316Ti is a Titanium Stabilized Stainless Steel. The addition of titanium is made to decrease the risk of intergranular corrosion and pitting when exposed to aggressive corrosive conditions at temperatures above 800° F. The corrosion resistance of 316L Stainless, the material utilized by most of our competition, is greatly reduced with extended exposure to these high temperatures. At low temperatures, both materials are pretty compatible but remember, combustion chamber temperatures on condensing boilers typically exceed 1600° F.

With typical pH levels between 4 – 5, similar to that of red wine, there's no question that the condensate produced by a condensing gas boiler is corrosive. When combining this low pH with high combustion temps, if you're looking for longevity, SA 240-316Ti used in the CU3A is the only choice.

YEAH BUT, IS IT MORE EFFICIENT?

This is really the important question, right? Is the CU3A more efficient than the competition? If we're going to ask the consumer to make an investment, we have to be able to show value. When we're talking about an investment in a new boiler, this "value" usually comes down to efficiency. It's no secret that most all condensing boilers advertise combustion or AFUE efficiencies within a percentage or two of 95%. The CU3A is right there, boasting some of the highest AFUE efficiencies in the industry.

Let's face it though, the difference of a point or two of AFUE in either direction isn't going put your kids through college. It probably won't even buy their books. The reality is that true efficiency is the ratio between the amount you pay to operate a piece of equipment and the amount of heat it delivers to your home or building. True efficiency requires a holistic approach and this is really where the CU3A shines.

Yes. The CU3A, like most of our competition, has an AFUE rating of 95%. This however, is where the similarity in overall efficiency ends. Unlike any of our competition, the CU3A has a feature called Lambda-Pro. Lambda-Pro is a combustion manager that constantly measures and adjusts the fuel to air ratio to maintain consistent excess air or oxygen levels. As you recall from an above paragraph, higher levels of oxygen reduce combustion efficiencies. How do oxygen levels change during the heating season? The two most prevalent ways are change in ambient temperature (or the change in temp of the burner's intake air) and change in the calorific value of the fuel. Both change constantly during the heating season. The other boilers may be 95% when drawing in nice warm air when it's 70° outside but, what happens when the outdoor temps drops to, say, 20°? Well, since colder air holds more oxygen, the efficiency is reduced. The CU3A with Lambda-Pro however, has the ability to modulate both the gas valve and the blower to insure that the perfect fuel to air ratio is always met. Our competition, only, modulates the blower.

Is electrical consumption important when discussing efficiency? It was, when Viessmann designed the CU3A. One of the biggest complaints of consumers that have had new condensing boilers installed is that, while they've certainly noticed a reduction in fuel usage, they have realized an increase in electrical consumption. Remember earlier, we discussed that most other residential boilers (including some of ours) require the addition of boiler pumps? These are pumps whose sole purpose is to circulate heating water through the boiler. They don't really deliver heat to the home. They are there to satisfy the needs of a low mass, high pressure drop boiler that has minimum flow requirements. What does this requirement translate to in dollars? Let's assume we live in an area with an electrical rate of \$0.14 per kWh. Keep in mind that this doesn't include the wattage of the boiler itself. It's just the added pump. The most common pump required by these low-mass boilers consumes about 150 watts per hour. In a New England winter, this single pump could account for about \$700 to \$800 per year. Consider this, in many cases, there is another one of these pumps making domestic hot water as well. Because of the CU3A's high-mass, low pressure drop design, this parasitic load is not required or desired.

Of course, serviceability comes in to play with regard to energy savings as well. As discussed before, our CU3A boilers are designed with ease of service and maintenance in mind. If our boiler can be serviced in half the time of our competition, this is more money in the consumer's pocket.

THE WINNER BY K.O.

It's clearer than ever; when considering a condensing boiler, the winner is the Viessmann Vitocrossal 300, CU3A. It is a true reflection of the Viessmann Philosophy in every way. From ease of installation and serviceability to, all encompassing, energy efficiency all while never sacrificing material quality for price, the CU3A is truly the evolution of the condensing boiler!

Technical Data



Vitocrossal 300, CU3A gas-fired condensing boiler

Model		26	35	45	57
AFUE	%	95	95	95	95
Minimum Input (NG)	MBH	19	25	43	43
Maximum Input (NG)	MBH	94	125	160	199
Net AHRI Rating	MBH	76	101	129	161
Overall Dimension[†]					
Width	Inches	26	26	26	26
Height	Inches	67	67	67	67
Depth (Length)	Inches	27	27	31.5	31.5
Weight	lbs	269	275	341	352
Boiler Water Content	USG	13.5	13	18.8	18.8
Heat Exchanger Surface	ft. ²	16.7	20.7	34.1	34.1
Maximum Operating Pressure	psig	30	30	30	30
Minimum Gas Supply Pressure					
Natural Gas	"w.c.	4	4	4	4
Liquid Propane Gas	"w.c.	10	10	10	10
Boiler water temperature maximum					
Adjustable high limit (AHL) range space heating (steady state)		190° F	190° F	190° F	190° F

For sales information, please contact:

Kevin Flynn

Viessmann Regional Sales Manager – New England

Email: flyk@viessmann.com